Ownership matrix	**RPP-27195**

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1.0 PURPOSE AND SCOPE

(5.1.1, 5.1.3, 5.1.4)

This standard identifies the requirements, frequencies of application, and the inspection elements necessary for the development, conduct, reporting, and reactions to specific fire protection analyses and assessments.

This standard applies to the following:

- Fire hazard analysis performed by or for the Tank Operation Contractor (TOC).
- Fire protection facility assessments for TOC-managed facilities performed in accordance with U.S. Department of Energy (DOE) criteria.
- Monthly facility inspections required by NFPA 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials."

2.0 IMPLEMENTATION

This standard is effective on the date shown in the header.

3.0 STANDARD

Fire protection assessments are documented evaluations of the implementation of the fire protection program. These assessments are performed by, or under the supervision, of a qualified fire protection engineer.

A qualified fire protection engineer is an engineer that is a graduate of an accredited university or college with a Bachelor of Science in an engineering or related technical field and meeting the qualifications for Member Grade in the Society of Fire Protection Engineers, or an engineer that has a member grade in the Society of Fire Protection Engineers, or an engineer that is a Registered Professional Fire Protection Engineer.

Assessments of the fire department (as required by this standard) shall be performed by an individual with qualifications and experience in all facets of fire department organization, equipment, staffing, and operations. Contractors shall perform program and facility assessments at a frequency described in this standard.

3.1 Fire Hazard Analysis

1. A fire hazards analysis (FHA) shall be completed for significant new facilities (new facilities that have a maximum possible fire loss (MPFL) of $25,000,000 or more, a new moderate hazard non-nuclear facility, or new high hazard non-nuclear facility), existing and new nuclear facilities, and other facilities as defined by DOE O 420.1C.

    a. Facilities required to have a fire hazard analysis shall have only one fire hazard analysis document.

b. Facility modifications that require a project will not have a standalone fire hazard analysis document but must be reflected in the facility fire hazard analysis document.

c. The FHA must be documented and show the thought process and assumptions required to arrive at the conclusion.

d. All approved variances, equivalencies, and exemptions, along with all supporting information, shall be provided or referenced in the FHA. Documentation of the basis for approved relief shall be reviewed during each FHA update to verify that conditions have not changed and the justifications are still valid.

e. The FHA shall be reviewed and updated, as necessary, in conjunction with the annual safety basis documentation updates, or during the Facility Fire Protection Assessment.

2. The purpose of a Fire Hazard Analysis (FHA) is to conduct a comprehensive assessment of the risk from fire in a facility to verify that fire safety objectives are met. The FHA may also incorporate facilities, other than buildings, when they are exposed or are integral to the building operations. The FHA usually is broken down by building, but may be further broken down into fire areas. The FHA is also a vital tool for incorporating appropriate fire protection criteria into designs in accordance with DOE-STD-1189-2008, and for demonstrating compliance with DOE orders and standards, building codes requirements, and fire protection standards. A FHA may also be required for facilities other than buildings if the value and hazard warrant.

3. Construction projects must have a preliminary FHA (PFHA) prepared at conceptual design and revised during definitive design of the Project design process. The preliminary FHA will be rolled into the current facility FHA at the completion of the project or released as a stand-alone FHA, whichever is appropriate.

A Fire Protection Design Analysis should be performed to ensure that fire protection program requirements are documented and incorporated into plans and specifications for new buildings and significant modifications to existing buildings. The Fire Protection Design Analysis or PFHA should be of sufficient detail to identify applicable design criteria for meeting the fire safety objectives.

A FHA shall be completed for transitional facilities. Transitional facilities are those facilities that have been placed in a safe-shutdown condition and may or may not be maintained, or are undergoing decontamination and decommissioning (D&D) work and ultimately demolition. The need for fire protection features in facilities and structures slated for transition should be governed by the consequences of a fire to the public, workers, and fire-fighters, as well as the potential release of hazardous and radiological materials while the facility is in the transition process. For facilities required by DOE O 420.1C to conduct a FHA, a transitional FHA shall be developed for facilities undergoing transition, including “cold & dark” (see DOE-STD-1066-2012, Appendix D). (5.1.2)

4. A transitional fire hazard analysis should identify the existing fire protection features and programs along with conditions where the feature or program can safely be reduced or eliminated; or, when it should be returned to service.

   - Facility construction, including interior finish
   - Fire protection features, their status, and plans for deactivation
   - Potential need to restore system to service for D&D
   - Facility hazards
   - The removal of combustibles, including flammable or combustible liquids
   - Periodic monitoring
   - Appropriate signage showing the status of facility and fire protection systems
   - Securing the facility from unauthorized entry
   - Requirements for performance of transitional activities
   - Maintaining worker safety
   - Fire department notifications, and
   - Other pertinent information as necessary.

5. The FHA must arrive at a conclusion that either the facility meets the fire protection objectives or does not meet the objectives with implementation actions that are required in order for the facility to meet the objectives.

6. The FHA must include an assessment of the risk from fire and related hazards (direct flame impingement, hot gases, smoke migration, firefighting water damage, fire exposure to structural members, etc.) in relationship to existing or proposed fire safety features to ensure that the facility can be safely controlled and stabilized during and after a fire.

7. In accordance with the “graded approach” concept, the level of detail necessary in the FHA is directly related to the complexity of the facility and the potential risk to the public, worker, and the environment.

   a. FHAs, using a graded approach, shall be conducted for all hazard category 1, 2, and 3 nuclear facilities, facilities that represent unique fire safety risks with values greater than $25 million.

   b. An FHA is required for new facilities or major modifications to existing facilities with a value greater than 150 million dollars.

8. The focus of the FHA shall be the individual fire areas that comprise the facility unless analytical deterministic modeling methods can demonstrate a lesser or greater fire potential.

    a. A fire area is defined as a location bounded by fire rated construction having a minimum fire resistance rating of 2 hours.

9. Fire models developed by the National Institute of Standards and Technology or fire models acceptable by the DOE Authority Having Jurisdiction that utilize deterministic fire behavioral methods may be used in the development of the FHA.

    a. Where assumptions are made in the fire hazards analysis regarding the combustible loading of a facility, facility-specific controls shall be developed to prevent exceeding the limits analyzed.

    b. The FHA shall not preclude the assumption of a fire from occurring when an energy source and a combustible source are present.

    c. Average combustible loading as a means to characterize the fire severity is also not considered an acceptable technique.

    d. Fire modeling software, which is used to support eliminating, limiting, or mitigating nuclear hazards to workers, the public, or the environment, must also meet the applicable quality assurance requirements of DOE O 414.1 C and DOE G 414.1-4.

10. For nuclear facilities, the accident analyses for fire and explosion events shall be consistent in both the FHA and facility nuclear safety documentation where the FHA author and the safety analyst jointly identify fire-related hazards and evaluate the postulated fire scenario(s).

    a. The final FHA shall be referenced by the facility Documented Safety Analysis (DSA), including, the final or interim safety analysis.

11. A FHA must be performed under the direction of a qualified fire protection engineer.

12. Fire scenario(s) development must be completed early as part of the project/document development process. This is accomplished at the preliminary hazards assessment stage, done in association with engineering studies and at the conceptual design stage in projects to establish the bounding of accidents within related safety analysis documents.

13. The fire hazard analysis author(s) must be familiar with the hazards analysis process and must participate in and/or review all the related hazard analysis process data. Ideally, the fire hazard analysis author(s) and safety document analyst(s) should jointly develop the preliminary hazards assessment (for fire related hazards) scenarios/consequences.

14. It will generally not be assumed in an analysis that fire will only cause the loss of function of the safety SSC equipment when power cables to that equipment are within the fire area. The potential for spurious signals causing mal-operation of such equipment or

fire-induced electrical faults resulting in tripped upstream electrical disconnect devices rendering safety SSCs inoperable must be considered. Similarly, the effects of combustion products, manual firefighting efforts, and the activation of automatic fire suppression systems, must also be assessed.

15. As a minimum, the FHA must contain information describing the following elements.

- Description of construction
- Protection of essential safety class and safety significant equipment
- Fire protection features
- Description of fire hazards
- Life safety considerations
- Critical process equipment
- High value property
- Damage potential: maximum possible fire loss (MPFL) and maximum credible fire loss (MCFL). See DOE M 231.1B, Attachment 3 for determining loss estimates.
- Fire department response
- Recovery potential
- Potential for a toxic, biological, and/or radiological incident due to a fire
- Emergency planning
- Security considerations related to fire protection
- Natural hazards (earthquake, flood, wind) impact on fire safety
- Exposure fire potentials, including the potential fire spread between fire areas
- Reference the fire department needs assessment baseline document.
- Deficiencies or “recommendations” that are required to be corrected to meet fire protection objectives.
- Risk of fire and related hazards (direct flame impingement, hot gases, smoke migration, firefighting water damage, etc.). See DOE G 420-1.3, Section 4.6.

- Calculations performed in support of Documented Safety Analyses (DSA) or Technical Safety Requirements (TSRs) shall be prepared in accordance with TFC-ENG-DESIGN-C-10.

3.1.2 Ventilation System Operation and Failures Analysis

1. Fire propagation and the potential for fire-induced radiological dispersal through the facility air distribution system must be considered. These effects must be considered for the normal operating mode of the air distribution system, as well as alternate modes that may result from the fire, such as shutdown.

2. The fire hazard analysis author(s) shall evaluate identified fire related hazards and possible fire event consequences (binning of related scenarios and using bounding events is acceptable). This evaluation will report fire propagation and effects on buildings, equipment, and processes.

3. A single fire scenario may not be the representative or bounding event for both fire loss and safety analysis concerns. In this case, multiple scenarios will be analyzed.

3.1.3 Simplifying Assumption

1. Where appropriate, as a simplification to the analysis, an assumption can be made that all potentially vulnerable systems will be damaged within the fire area.

2. Acceptable exceptions to this assumption are:

   - Water-filled steel pipes and tanks, and/or

   - Similar components of superior structural integrity with welded fittings and adequate pressure relief.

3.1.4 High Bay Facilities and Areas

The fire hazard analysis for high bay locations shall consider the effects of smoke/hot gas stratification that may occur at some intermediate point below the roof or ceiling. Similarly, the effect of smoke movement through doors and dampers held open by fusible links will be addressed.

3.1.5 Fire Hazard Analysis Approvals

1. All fire hazard analyses require the TOC Safety and Health organization fire protection engineer's review and approval.

2. A copy of the FHA is transmitted to DOE-ORP for information purposes through the DOE-ORP Contracting Officer.

3. A copy of the FHA should be submitted to the Hanford Fire Marshal's office for their information.

3.1.6 Implementation Plans for FHAs

1. The results of a fire hazard analysis may determine that implementation of "recommendations" or corrective actions to address deficiencies are required in order for the facility to demonstrate that the fire protection objectives of DOE O 420.1C and life safety are met.

2. If a FHA implementation plan is warranted following completion and ORP review of the FHA, a plan will be developed and include:

   - A description of each recommendation or deficiency requiring action
   - Implementation strategies
   - Funding, and
   - Schedule for each item recommended or determined to be deficient by the FHA.

3. The FHA implementation plan shall be submitted to the ORP Contracting Officer Representative for review.

4. If a change occurs, in which the FHA recommendation is no longer valid or cannot be accomplished due to a change in operation considerations, the FHA shall be modified as appropriate and resubmitted to ORP for review.

3.1.7 Maintenance of the FHA

1. Review every three years as a minimum.

2. Revise when:

   - Changes to the annual DSA updates impact the contents in the FHA
   - A modification to an associated facility poses a significant new fire safety risk, or
   - The three year review identifies the need for changes.

3.1.8 Fire Hazard Analysis Records

The fire hazards analysis is considered record material and shall be retained in accordance with TFC-BSM-IRM_DC-C-02.

3.2 Fire Protection Facility Assessment Requirements

The principal objective of a fire safety assessment is to identify deficiencies that would prevent the achievement of DOE's fire safety policy objectives.

1. Facility and programmatic assessments should be performed under the supervision of a qualified fire protection engineer as defined in Section 3.0 of this Standard. Personnel conducting such assessments should have an appropriate level of knowledge and experience in the application of fire safety codes and standards to diverse facilities.

2. The TOC fire protection engineer shall prepare an annual fire protection facility assessment schedule for the facilities under their responsibility in accordance with the frequencies provided below and the facility values found in the Property Management Records.

   a. The reliability of information in the Property Management Records is enhanced when there is frequent communication with the Facilities and Property Management Group. Incorrect information such as that relating to facilities improperly included in the list, missing from the list, must be identified and communicated to Property Records. This action will assist in maintaining a current database

   b. Annual assessments shall be made of facilities valued in excess of $100 million (structure and content) or where a non-nuclear facility is considered to be high hazard facility.

   c. Assessments shall be made at least every three years for facilities valued at $3 million to $100 million, where a non-nuclear facility is considered to be a moderate hazard facility, or Category 1, 2, or 3 nuclear facility.

   d. Facilities, where property is less than $3 million shall not require a fire protection facility assessment that contains the required nature and scope elements unless significant programmatic impacts, hazardous materials, or radioactive materials are involved. If such facility assessments are required, they shall be made at least every three years.

   e. Facility assessments shall address, as a minimum, the following items as they relate to fire protection:

      - Fire protection of safety class and safety significant equipment
      - Applicable codes and standards
      - Life safety considerations
      - Fire detection and alarm systems and equipment
      - Fire and explosion hazards
      - Fire protection of vital programs
      - Fire protection of high value property
      - Inspection, testing, and maintenance reports
      - Tests, inspections, procedures, and records for maintaining fire protection systems and features
      - Suppression equipment

- Water runoff
- Facility fire prevention planning documents (evacuation plan/fire wardens extinguisher training)
- Emergency response capability, including fire apparatus accessibility to a facility
- Administrative controls
- Temporary protection and compensatory measures
- Completeness of fire hazards analysis
- Fire barrier integrity
- Fire loss potentials[1] (maximum credible and maximum possible), status of findings from previous survey
- Fire safety training
- Potential for toxicological, biological, and/or radiological incident due to fire
- Conformance with applicable Orders, codes, and standards
- Adequacy of facility appraisal reports
- Compensatory measures of equivalencies and exemptions to determine their validity
- A list of all noted deficiencies, along with a recommendation for status of previous findings and tracking until resolution

f. Assessment reports should include a description of what was accomplished during the effort (areas toured, documents reviewed, and people interviewed).

g. Assessment should feature a "baseline" description of the facility, hazards, and other occupancy considerations, and fire protection features.

h. Assessment should document changes of significance that have occurred within the facility since the last assessment that affect fire safety.

i. The assessments shall be performed using the "long" form or "short" form. The long form is intended for large, high-valued facilities, while the short form is

[1] See DOE M 231.1, Appendix C, for determining loss estimation.

intended for small low-valued facilities. The company fire protection engineer shall determine the appropriate form to use based on the individual facility being assessed.

j. Findings or recommendations noted in assessments will be documented on a Action Request, in accordance with TFC-ESHQ-Q_C-C-01.

3.3 Fire Protection Program Assessments

1. Fire protection program assessments shall be made every three years.

2. Fire protection assessments shall be retained by the contractor and made available to the Office of River Protection representative upon request. Copies of the two most recent assessment reports shall be readily accessible on file (e.g., data file).

3. Assessments shall include the following program elements:

- Comprehensiveness of the fire protection program
- Procedures for engineering design and review
- Procedures and personnel for maintenance, testing, and inspection of installed fire protection systems and features
- Emergency Services Organization including the baseline needs assessment
- Fire protection engineering staff (number, qualifications, training)
- Management support
- Exemptions and documented equivalencies or deviations
- Inspection, testing, and maintenance reports
- Adequacy of facility appraisal/assessment reports
- Tests, inspections, procedures, and records for maintaining fire protection systems and features
- Administrative controls
- Temporary protection and compensatory measures
- Status of findings from previous assessments
- Conformance with applicable orders, codes, and standards

- A list of all noted deficiencies, along with a recommendation for remediation and interim compensatory measures, if necessary, pending resolution.

Fire protection assessment findings, observations, and/or recommendations shall be submitted as an Action Request (AR) via the integrated Contractor Assurance System (iCAS) in accordance with TFC-ESHQ-Q_C-C-01. This shall include assessments generated both internally and externally.

3.3.2 Monthly NFPA 801 Housekeeping Inspections

An element of the fire prevention program required by NFPA 801, "Fire Protection for Facilities Handling Radioactive Materials," is documented housekeeping inspections.

The requirement shall be reflected in the appropriate Operations document/recall system.

1. A documented facility inspection conducted at least monthly.

   Abandoned nuclear facilities or tank farms on quarterly entry will be evaluated for alternative means for compliance on a case by case basis.

2. Remedial actions to correct conditions that increase fire hazards.

3.4 Fire Safety Exemptions and Equivalencies

It is the intent of the ORP Fire Protection Program to encourage the application of alternative and innovative fire protection methods that will meet the objectives of the fire protection program. Therefore, fire safety exemptions and equivalencies from these requirements are encouraged.

1. Documented requests for relief from code criteria should be developed by a qualified fire protection engineer or certified fire department officer.

2. The level of documentation necessary to support a request for relief will vary depending on the issue.

3. For business occupancies, the methods outlined in NFPA 101A, Guide on Alternative Approaches to Life Safety, may be applied to support equivalency requests in which strict compliance with NFPA 101 is not practical.

4. As a minimum each request should include the following elements.

   - The specific site location or condition for which the exemption or equivalency is requested.

   - The specific requirement from which the request seeks an exemption or equivalency.

   - Detailed statements of why the contractor is unable to comply with the requirement or why it is inappropriate in the given situation.

- A statement of the actions planned, or taken, to provide equivalent protection from the hazards covered by the requirement.

- An analysis of the benefit to be gained from the exemption or equivalency (or negative impact on the program or facility if the request is not approved) versus the maximum loss potential under the equivalency or exemption.

- Supporting documentation justifying approval of the exemption or equivalency, including a review by a qualified fire protection engineer. Exemptions and equivalency requests for fire safety issues involving facilities that require a fire hazard analysis must be supported by the facility FHA and can be included in the FHA approval process, if exclusive to the facilities and activities scoped in the FHA.

- Duration for which the request is being made.

- Information required by DOE M 251.1-1A, "DOE Directives System Manual."

- The process for the review and approval of fire protection-related exemption and equivalency requests is as follows.

  – The request is submitted to WRPS Fire Protection for review and approval.

  – The request is submitted to the Hanford Fire Marshal for review and approval. The Fire Marshal approval shall be documented by a letter from the Hanford Fire Marshal indicating he has reviewed and approves the equivalency or exemption.

  – Equivalency or exemption requests are transmitted through the DOE-ORP Contracting Officer.

  – A Fire Marshal approval letter shall be included as part of the submittal

  – Authority for approval. The authority for approval of fire protection-related exemptions and equivalencies is contained in DOE O 420.1C, DOE O 440.1B, MGT-ENG-IP-05, Rev. 3, and DOE occupational safety and health response line request numbers D98-01-020 and D98-08-009.

5. When compensatory measures are used as administrative controls in an equivalency or exemption request, they shall remain in place and be reviewed annually until the request has been withdrawn or revised.

4.0 DEFINITIONS

No terms or phrases unique to this standard are used.

5.0 SOURCES

5.1 Requirements

5.1.1 DOE O 420.1C, "Facility Safety."

5.1.2 DOE-STD-1066-2012, "Fire Protection."

5.1.3 MGT-ENG-IP-05, Rev. 3, "Fire Protection Program."

5.1.4 TFC-POL-16, "Integrated Safety Management System Policy."

5.2 References

5.2.1 10 CFR 851, "Worker Safety and Health Program."

5.2.2 DOE M 231.1, "Environment, Safety and Health Reporting Manual."

5.2.3 HNF-SD-GN-FHA-30001, "Integration of Fire Hazards Analysis and Safety Analysis Report Requirements."

5.2.4 TFC-BSM-IRM_DC-C-02, "Records Management."

5.2.5 TFC-ENG-DESIGN-C-10, "Engineering Calculations."

5.2.6 TFC-ESHQ-Q_C-C-01, "Problem Evaluation Request."